SYSTEM OF SAFETY SECURITY AND INCREASE IN EFFICIENCY OF MEAT PRODUCTS MANUFACTURE USING COMPUTER TECHNOLOGIES

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Background

Meat products safety and their quality can be secured due to careful control at all stages of production processes, from the moment of raw materials delivery to the enterprise till realization of finished products.

At present guaranteed safety of meat products is secured through observance of technological regulations set fourth in the requirements of regulatory documents and standards. Objective control of raw materials and finished products safety is usually carried out by the utilization of devices, units and traditional methods requiring sufficient material costs and time. The progress reached during the last ten years in the sphere of instrumental methods and means of meat products manufacture control, realized in express-analyzers, allows to accelerate this procedure but gives no possibility to assure continuous control over all operations, and considerably reduces the organization level of production safety operative monitoring during its manufacture, limits the ability to timely influence technological processes.

In this connection a new approach to guarantee sanitary and microbiological safety indices of meat products manufacture and improve their quality, based on the system of computer monitoring and management of production on the basis of computable mathematical models was proposed.

Objectives

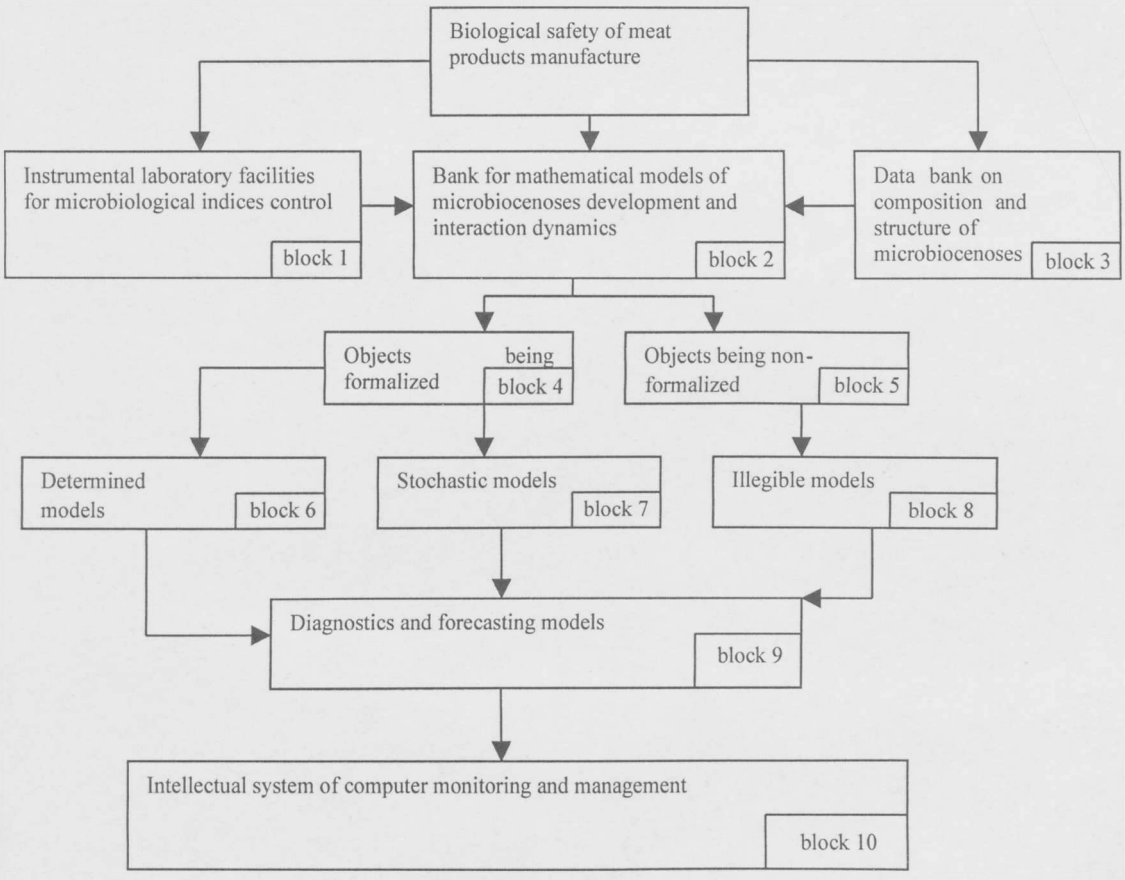
Meat raw material, raw smoked sausages and mathematic models of raw smoked sausage manufacturing.

Methods

Quality and safety assessment was carried out based on physical and chemical, biochemical and microbiological analysis.
Correlation and regression analysis were used for modeling.

Results and Discussion

Realization of this approach (see Figure below) is based on experimental data obtained by the employment of traditional methods of microbiological and physicochemical investigations, and includes creation of a bank for mathematical models, tracing the dynamics of microbiocenoses development and interaction during technological processing of meat.



According to this diagram, block 1 ensures operative forming of initial conditions vector for subsequent computer modeling of microbiocenoses development and interaction dynamics (block 2), and block 3 – assigning of boundary conditions vector .

Depending on information definiteness of controllable objects (blocks 4 and 5), mathematical model systems (blocks 6, 7 and 8), by means of which diagnosis of the production biological safety current state is formed and possible ways of microbiocenosis development are predicted (block 9), were developed. As a result, strategy of production control (block 10) is determined. A system of stochastic models (block 7) was developed and computer modeling aimed at increase in efficiency and security of raw-smoked sausage production safety was carried out using the above mentioned diagram.

Conclusions

Practical realization of this approach and further extension of the sphere of the proposed development application will allow to create conditions for calculation of optimal regimes for meat raw material processing which secure achievements of target functions extremums dealing with manufacture of various high-quality meat products with guaranteed biological safety.